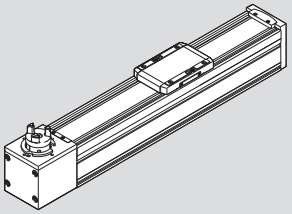
ELGC-TB
Toothed belt axis



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www.festo.com

Operating instructions

8117267
2021-04b
[8117269]

8117267

Translation of the original instructions

1 Applicable Documents

All available documents for the product ➔ www.festo.com/sp.

2 Safety

2.1 Safety instructions

- Observe labelling on the product.
- Prior to assembly, installation and maintenance work: Switch off power supply, ensure that it is off and secure it against being switched back on.
- Store the product in a cool, dry, UV-protected and corrosion-protected environment. Ensure that storage times are kept to a minimum.
- Observe tightening torques. Unless otherwise specified, the tolerance is ± 20 %.

2.2 Intended use

The axis is intended to be used for positioning payloads in combination with tools or as a drive when external guides are used.
The axis is only approved for slide operation.

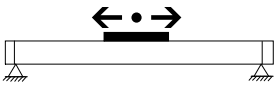


Fig. 1: Slide operation

2.3 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers.
The qualified personnel have knowledge and experience in dealing with electric drive systems.

3 Additional information

- Contact the regional Festo contact if you have technical problems ➔ www.festo.com.
- Accessories and spare parts ➔ www.festo.com/catalogue.

4 Product overview

4.1 Function

The axis converts the rotary motion of the mounted motor into a linear motion of the slide. The toothed belt drive converts the torque of the motor into a feed force. The linear movement of the slide is precisely guided by the guide. The integrated cover strip prevents abraded particles from penetrating the immediate vicinity of the drive. Sensors monitor end positions, reference position and intermediate position.

4.2 Product design

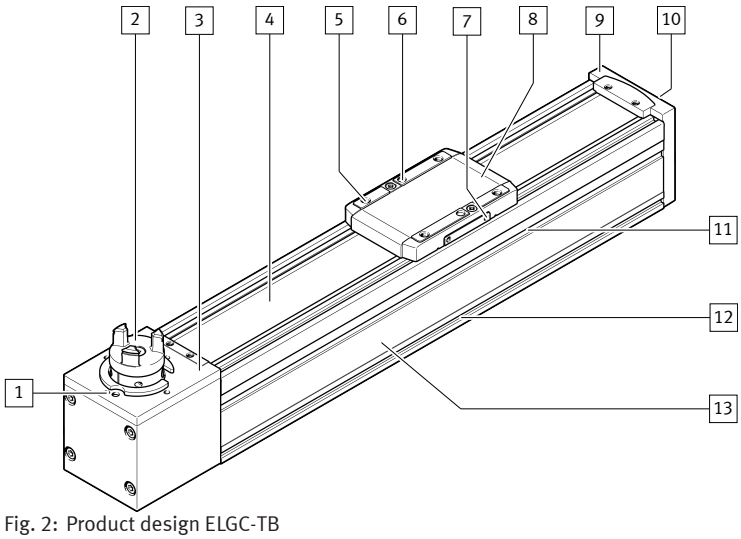


Fig. 2: Product design ELGC-TB

1 Threaded hole for motor mounting kit
2 Drive shaft
3 Drive cover
4 Cover strip
5 Threaded hole for attachment component
6 Centring hole for attachment component
7 Threaded hole for switch lug
8 Slide
9 End cap
10 Sealing air connection
11 Slot for sensors and sensor brackets
12 Slot for profile mountings
13 Profile

5 Transport and storage

NOTICE

Unexpected and unbraked movement of components

- Secure moving components for transport.

Transport and storage conditions

- Take product weight into account ➔ Technical data.
  Weight › 25 kg: transport with a suitable hoist (cross-brace) or with two persons.
- Take the centre of gravity of the product into consideration.
- Comply with maximum permitted support clearances when attaching transportation aids ➔ Technical data.
- Store and transport the product in its original packaging.
- Store product in a cool, dry, shaded and corrosion protected environment.
- Store product in areas where it is not exposed to oils, greases and degreasing vapours.
- Keep storage times short.

6 Assembly

6.1 Safety

⚠ WARNING

Risk of Injury due to Unexpected Movement of Components

For vertical or slanted mounting position: when power is off, moving parts can travel or fall uncontrolled into the lower end position.

- Bring moving parts of the product into a safe end position or secure them against falling.

6.2 Unpacking product

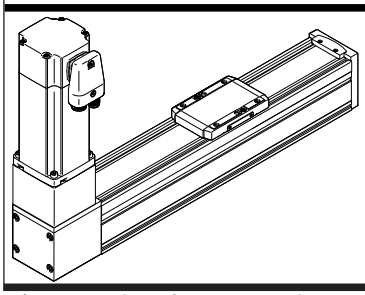
Protection of the cover strip

The cover strip is equipped with a protective cover to prevent damage. This protective cover must be removed and disposed of before commissioning. After removing the protective cover, mechanical damage and contamination of the cover strip must be avoided.

1. Open packaging.
2. Remove all transport materials (e.g. foils, caps, cardboard boxes).
3. Remove the product from the packaging and place it on the mounting surface. Comply with maximum permitted support clearances when attaching transportation aids ➔ 12.2 Characteristic curves.
4. Dispose of packaging and transport materials.

6.3 Mounting the motor

Axial kit EAMM-A



Tab. 1: Overview of motor mounting

Only loosen screws or threaded pins that are described in the directions in the instruction manual.

1. Select the motor and motor mounting kit from Festo➔ www.festo.com/catalogue.
   When using other motors: observe the critical limits for forces, torques and velocities.
2. Fasten motor mounting kit, observe instructions ➔ www.festo.com/sp.
3. Fasten the motor without tension. Support large and heavy motors.

Connect motor cables only on completion of mounting.

6.4 Mounting axis

Requirement

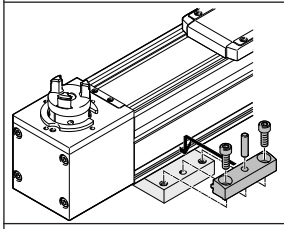
- No collision in the movement space of the attachment component with motor, mounting and sensor components.
- Sufficient space to reach maintenance interfaces.
- Sufficient space for reaching and securing the sealing air connection.
- Flatness of the mounting surface of 0.05 %of the stroke length or maximum 0.5 mm over the stroke length of the bearing surface.
- No distortion or bending when installing the product.

1. Select mounting attachments ➔ www.festo.com/catalogue.
2. Place the mounting attachments on the support points.
3. Tighten retaining screws.
   Observe the maximum tightening torque and screw-in depth.

In the case of planar and 3-dimensional gantries, pay attention to parallelism, product height and alignment of the axes.
For additional information, contact your local Festo Service.

Profile mounting EAHF-L2

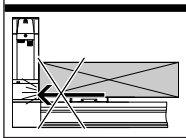
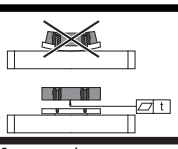
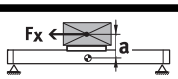
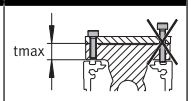
Mounting via profile groove



Instruction manual ➔ www.festo.com/sp.

Tab. 2: Overview of mounting component

6.5 Mounting the attachment component

Collision-free	Flatness	Centre of gravity and tilting moment	Max. screw-in depth
			

Tab. 3: Requirement for attachment component

Requirement:

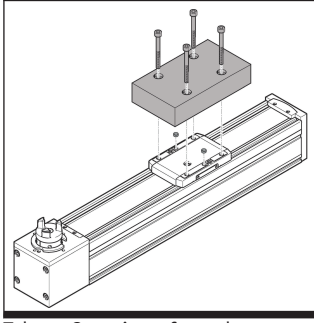
- No collision in the movement space of the attachment component with motor, mounting and sensor components.
- Flatness of the mounting surface of the attachment component of 0.01 mm above the slide surface.
- Minimise breakdown torque with force Fx. Short lever arm a from the centre of the guide ◒ to the centre of gravity of the attachment
- The maximum screw-in depth of the retaining screws is not exceeded.

1. Select accessories ➔ www.festo.com/catalogue.
2. Place centring components in centring holes.
3. Position the attachment component on the slide.
4. Tighten retaining screws.
   Observe the maximum tightening torque and screw-in depth.

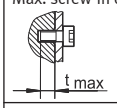
When using an additional guide axis or external guide, ensure that the axes and guide are aligned exactly parallel.
Recommendation: use guide mountings with tolerance compensation.

Direct fastening

Mounting via thread



Tab. 4: Overview of attachment component

Size		45	60	80
Direct fastening				
Screw		M4	M5	M6
Max. tightening torque	[Nm]	2.9	5.9	9.9
Max. screw-in depth t_{max} 	[mm]	7.8	10.8	14.7
Centring (bore tolerance H7)				
Centring pins	[mm]	∅ 4	–	
Centring sleeve	[mm]	–	∅ 5	∅ 7

Tab. 5: Information on attachment component

6.6 Mounting accessories

Requirement

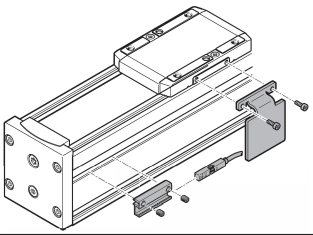
- No collision in the movement space of the attachment component with motor, mounting and sensor components.
- Protection against uncontrolled overtravel of the end positions.
- Referencing to reference switch or end position.
- Query of end positions or intermediate positions.

1. Select accessories ➔ www.festo.com/catalogue.
2. Mount the sensor (reference or query):
   - Mount the sensor bracket and switch lug (depending on the type of mounting).
   - Mount the sensor.

Instruction manuals ➔ www.festo.com/sp.

Sensor bracket and switch lug

- Switch lug: mounting on slide
- Sensor bracket: mounting via profile groove



- Protect the sensor from external magnetic or ferritic influences (e.g. min. 10 mm distance to slot nuts).
- Preferably use hardware limit switches with normally closed function (protection guaranteed even in case of sensor failure).
- Query switching lug only with inductive sensor.
- Query integrated magnets in the slide only with magneto-resistive sensor.

Instruction manual ➔ www.festo.com/sp.

Tab. 6: Overview of sensor mounting

Connecting sealing air

The use of overpressure or negative pressure in the range of approx. ± 0.02 MPa (± 2.9 psi; ± 0.2 bar) reduces or prevents the following contamination:

- The application of negative pressure minimises the release of abraded particles into the environment.
- Applying overpressure reduces the penetration of dirt into the drivetrain.

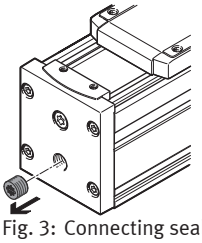


Fig. 3: Connecting sealing air

1. Remove the sealing air plug screw from the threaded hole.
2. Mount the screw fitting and connect the hose.

7 Commissioning

7.1 Safety

⚠ WARNING

Risk of injury due to unexpected movement of components.
- Protect the positioning range from unwanted intervention.
- Keep foreign objects out of the positioning range.
- Perform commissioning with low dynamic response.

7.2 Performing commissioning

NOTICE

Elasticity of the toothed belt
The elasticity of the toothed belt generates an additional spring effect at high acceleration and deceleration, which can lead to an inadmissible nominal/actual deviation when the slide is moved or when the end position is reached.
- Consider the setpoint deviation determined during the test run during parameterisation of position setpoint values.

i

When the motor is removed, the motor encoder loses its absolute reference to the reference mark (e.g. by turning the motor drive shaft).
- Carry out a homing run after every motor mounting in order to establish the absolute reference between the motor encoder and the reference mark.

i

Running noises during operation
Identically constructed axes can generate different running noises depending on the parameterisation, mode of operation, type of mounting, installation environment and components.

i

For use with reduced particle emission
- Clean product ➔ 9.3 Cleaning.

Requirement
- Mounting of the drive system checked.
- The protective cover of the cover strip is removed.
- Installation and wiring of the motor checked.
- No foreign objects in the movement space of the drive system.
- Maximum permissible feed force and drive torque not exceeded as a function of acceleration, deceleration (e.g. stop function, quick stop), velocity, moving mass and mounting position.
- No mechanical overload of the axis and dynamic setpoint deviation not exceeded (e.g. overrunning the end position) due to force and torque peaks or overshoot effects.
  Limit overloads and overruns by jerk limitation, lower acceleration and deceleration setpoints or optimised controller settings.
- Control and homing travel at reduced velocity, acceleration and deceleration setpoint values.
- No test run to mechanical end stops.
- Software end positions do not lie within the effective range of the mechanical stops.

Steps	Purpose	Note
1. Check travel	Determining the direction of travel of the slide	– The direction of movement of the slide for positive and negative position values depends on the mounting position of the motor on the axis. – Set a required reversal of direction of rotation via parameters in the controller or controller.
2. Homing	Determination of the reference point and adjustment of the dimensional reference system – during the initial start-up procedure – after replacement of the motor	Permissible reference points: – towards reference switch. – travel at reduced velocity ➔ Technical data. – towards end position: do not exceed maximum values ➔ Tab. 8 Speed and energy at the end positions. Further information ➔ Instruction manual of the drive system, ➔ www.festo.com/sp.
3. Test run	Checking the operating conditions	Check application requirements: – Slide travels through the complete travel cycle in the specified time. – Slide stops moving when a limit switch is reached.
After a successful test run, the drive system is ready for operation.		

Tab. 7: Commissioning steps

Size		45	60	80
Max. stop velocity	[m/s]	0.01		
Max. stop energy	[mJ]	0.125	0.25	0.5
Calculation of the maximum stop energy				
$E_{max} = \frac{v^2 * m}{2}$		– v = max. stop velocity – m = mass of all linear moving components Additional information ➔ www.festo.com/catalogue		

Tab. 8: Speed and energy at the end positions

8 Operation

⚠ WARNING

Risk of injury due to unexpected movement of components.
- Protect the positioning range from unwanted intervention.
- Keep foreign objects out of the positioning range.
- Perform commissioning with low dynamic response.

9 Maintenance

9.1 Safety

⚠ WARNING

Unexpected movement of components.
Injury due to impacts or crushing.
- Before working on the product, switch off the control and secure it to prevent it from being switched back on accidentally.

9.2 Checking axis elements

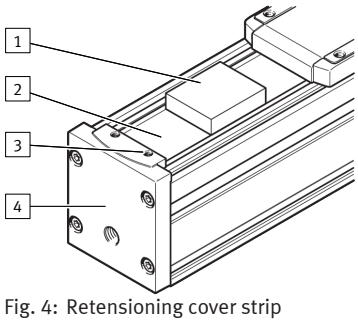
Check toothed belt wear

i

The pretension of the toothed belt is designed for the entire service life.
Tensioning of the toothed belt is not permitted.

1. ELGC-TB:
   – Initial check: after 5000 km.
   – Periodic check: every 1000 km.
2. If there is visible wear on the toothed belt: send the axis to Festo or contact ➔ www.festo.comFesto Service.

Checking the cover strip
- Check: every 2000 km.
  If waves form, the cover strip must be retensioned.



1 Clamping element
2 Cover strip
3 Screw
4 End cap

Fig. 4: Retensioning cover strip

Retension cover strip on both sides
1. Loosen screws 3.
2. Push cover strip 2 into the end cap 4.
3. Tighten cover strip with a clamping element 1.
4. Tighten the screws.
   Tightening torque: size 45: 0.2 Nm; size 60/80: 0.8 Nm.

i

If it is no longer possible to retighten the cover strip, the belt reversals and the cover strip should be replaced➔ www.festo.com/spareparts.

Clamping element ➔ www.festo.com/catalogue.

9.3 Cleaning

– Clean the product with a clean, soft cloth and non-abrasive cleaning agents.
For use with reduced particle emission:
– Remove abrasion and contamination from the product on the following schedule:
  – Prior to initial commissioning.
  – Regularly during operation.

9.4 Lubrication

i

The axis is lubricated for life.
Additional lubrication of the axis is not necessary.

10 Malfunctions

10.1 Fault clearance

⚠ WARNING

Unexpected movement of components.
Injury due to impacts or crushing.
- Before working on the product, switch off the control and secure it to prevent it from being switched back on accidentally.

⚠ WARNING

Risk of injury due to unexpected movement of components.
- Protect the positioning range from unwanted intervention.
- Keep foreign objects out of the positioning range.
- Perform commissioning with low dynamic response.

Malfunction	Possible cause	Remedy
Loud running noises, vibrations or rough running of the axis.	Coupling distance too short.	Observe permissible coupling spacings ➔ Instruction manual for motor mounting kit, ➔ www.festo.com/sp.
	Torsional stresses	– Install axis without tension. Make sure that the contact surface is flat ➔ 6.4 Mounting axis. – Change the layout of the attachment component (e.g. payload). – Align axes parallel to each another.
	Current controller settings.	Optimise controller data (e.g. velocity, acceleration, ...).
	Resonance oscillation of the axis.	Change the travel velocity.
	Wear on bearing or guide.	– Contact local Festo Service. – Replace axis ➔ www.festo.com/catalogue.
	Toothed belt wear.	– Contact local Festo Service. – Replace axis ➔ www.festo.com/catalogue.
Vibrations on the slide.	Operation at the resonant frequency of the axis.	– Change the travel velocity. – Change the acceleration. – Increase axis stiffness (e.g. shorter support distances). – Change the payload geometry.
Long oscillations of the profile.	Resonant frequency of profile and payload too low.	– Optimise controller data (e.g. velocity, acceleration, ...). – Change the payload geometry.
Slide does not move.	Coupling slips.	Check the mounting of the shaft-hub connection ➔ Instruction manual for the motor mounting kit, ➔ www.festo.com/sp.
	Loads too high.	Reduce forces and torques. Consider dynamics.
	Screws for mounting the attachment component are too long (e.g. payload).	Observe the screw-in depth ➔ Tab. 5 Information on attachment component.
	Toothed belt ripped.	– Contact local Festo Service. – Replace axis ➔ www.festo.com/catalogue.
Overruns the end position.	Sensor does not switch.	Check sensor, installation and parameterisation.
Idling torque too high.	Wear in the drivetrain.	– Contact local Festo Service. – Replace axis ➔ www.festo.com/catalogue.
Toothed belt skips.	Toothed belt pretensioning too low.	– Contact local Festo Service. – Replace axis ➔ www.festo.com/catalogue.
	Current controller settings.	Optimise controller data (e.g. velocity, acceleration, ...).
	Loads too high.	Reduce travel speed.
Wave formation on the cover strip or aluminium abrasion on the axis.	Wear on belt reversals.	– Retension cover strip ➔ Checking the cover strip. – Replace belt reversal and cover strip ➔ www.festo.com/spareparts.

Tab. 9: Overview of fault clearance

10.2 Repair

The product can be repaired or maintained.
- Spare parts and accessories ➔ www.festo.com/spareparts.
- Replace with an identical product ➔ www.festo.com/catalogue.

11 Disassembly

⚠ WARNING

Unexpected movement of components.
Injury due to impacts or crushing.
- Before working on the product, switch off the control and secure it to prevent it from being switched back on accidentally.

⚠ WARNING

Risk of Injury due to Unexpected Movement of Components
For vertical or slanted mounting position: when power is off, moving parts can travel or fall uncontrolled into the lower end position.
- Bring moving parts of the product into a safe end position or secure them against falling.

1. Disconnect electrical installations.
2. Remove the mounted attachment component.
3. Remove the attached accessories.
4. Remove motor and mounting kit.
5. Remove the mounting attachments.
6. Observe transport information ➔ 5 Transport and storage.

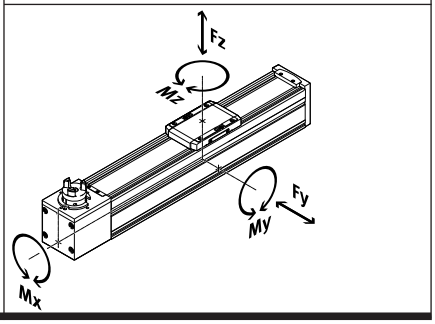
12 Technical data

12.1 Technical data, mechanical

i

Use the Festo sizing software for sizing the drive➔ www.festo.com/sp.

Additional information ➔ www.festo.com/catalogue.

Size	45	60	80
Design	Electromechanical axis with toothed belt		
Guide	Recirculating ball bearing guide		
Mounting position	any		
Max. feed force Fx [N]	75	120	250
Max. driving torque [Nm]	0.716	1.49	4.18
Max. no-load driving torque at v = 0.2 m/s and with cover strip [Nm]	0.075	0.194	0.413
Max. velocity [m/s]	1.2	1.5	1.5
Max. acceleration [m/s²]	15		
Repetition accuracy [mm]	± 0.1		
Feed constant [mm/rev]	60	78	105
Ambient temperature [°C]	0 ... +50		
Storage temperature [°C]	–20 ... +60		
Degree of protection	IP40		
Max. permissible forces and torques on the slide			
Fy [N]	300	600	900
Fz [N]	600	1800	2700
Mx [Nm]	5.5	29.1	59.8
My [Nm]	4.7	31.8	56.2
Mz [Nm]	4.7	31.8	56.2
Calculating the load comparison factor			
fv	$f_v = \frac{\lvert F_{y,dyn}\rvert}{F_{y,max}} + \frac{\lvert F_{z,dyn}\rvert}{F_{z,max}} + \frac{\lvert M_{x,dyn}\rvert}{M_{x,max}} + \frac{\lvert M_{y,dyn}\rvert}{M_{y,max}} + \frac{\lvert M_{z,dyn}\rvert}{M_{z,max}} \leq 1$		
			

Tab. 10: General data; ELGC-TB

Size	45	60	80
Materials			
Note on materials	Contains PWIS		
Profile	Anodised aluminium		
Drive cover End cap	Die-cast aluminium, painted		
Slide	Die-cast aluminium		
Guide Ball bearing Screws	Steel		
Cover strip	High-alloy steel		
Toothed belt	Polychloroprene with glass cord and nylon coating		
Guide pulley	Aluminium		
Weight			
Basic weight at 0 mm stroke [kg]	0.76	1.78	3.50
Added weight per 1000 mm stroke [kg]	2.3	4.3	7.3

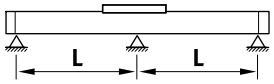
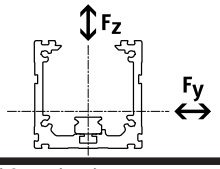
Tab. 11: Materials and weight

12.2 Characteristic curves

Additional information ➔ www.festo.com/catalogue.

Support spacing ELGC-TB-45/60/80

Maximum permissible support distance L (without profile mounting EAHF) as a function of force Fy/Fz with a maximum deflection of 0.5 mm.

Support spacing	Force load
	

Tab. 12: Overview of support spacing and force load

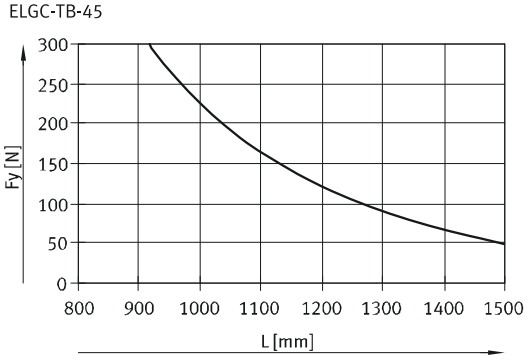


Fig. 5: ELGC-TB-KF-45, support distances L as a function of force Fy

ELGC-TB-45

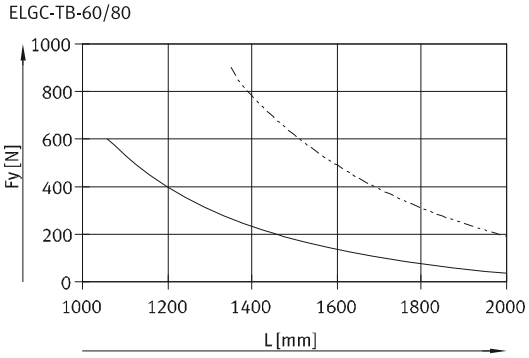


Fig. 6: ELGC-TB-KF-60/80, support distances L as a function of force Fy

ELGC-TB-60 ELGC-TB-80

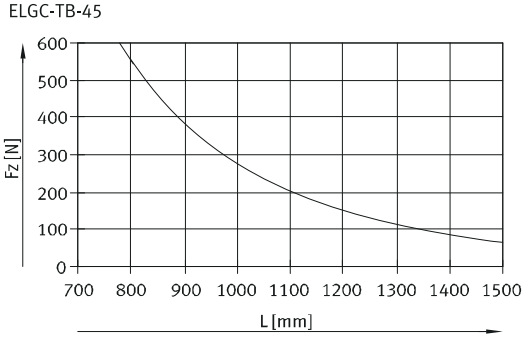


Fig. 7: ELGC-TB-KF-45, support distances L as a function of force Fz

ELGC-TB-45

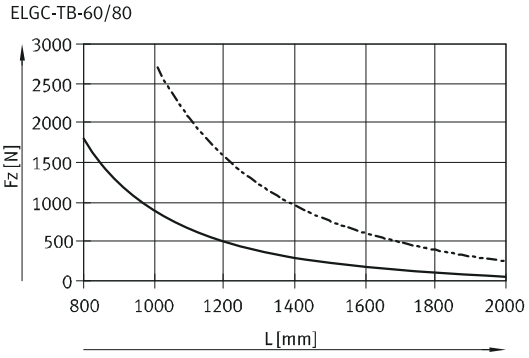


Fig. 8: ELGC-TB-KF-60/80, support distances L as a function of force Fz

ELGC-TB-60 ELGC-TB-80

Velocity – rotational speed ELGC-TB-45/60/80
Velocity v as a function of the rotational speed n.

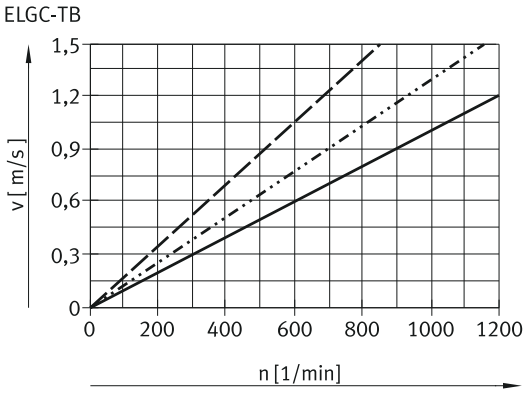


Fig. 9: ELGC-TB, velocity v as a function of the rotational speed n

ELGC-TB-45 ELGC-TB-80
ELGC-TB-60